UUI: Reusable Spatial Data Services in Unified User Interface at NASA GES DISC

http://disc.gsfc.nasa.gov/uui/

Maksym Petrenko
Mahabaleshwa Hegde
Keith Bryant
Long B. Pham

2016 AGU Fall Meeting, Session IN040, 16 December 2016
Data Services at GES DISC

• GES DISC is a data center that provides access to large-scale archives of earth science data

• Also applications and services built on top of the data
Going forward

Unified User Interface

Context (space, time, data, keywords...)

Information | Visualization | Subset | Search

Data

GUI

Data Services

Data Archive
Unified User Interface (UUI)

Search/find/navigate ANY DATA RESOURCE, while retaining CONTEXT for cross-resource SEAMLESS NAVIGATION:

- Data granules
- Data subsets (in bulk)
- Data visualization in/from Giovanni
- Data Documentation
- Dataset Landing Pages
Data access and available services
Services

• Build around a notion of web services
  • Small, self-contained, web-accessible building blocks
  • Can be reused and chained to build more complex services

• Each service provides a well-defined specification
  • Allows for an easy verification, integration, maintenance
  • JSON WSP as a main vehicle, enhanced based on …
  • OpenSearch / GEO and OGC WPS recommendations

• Legacy services wrapped in JSON WSP
Architecture

AngularJS

Web Page
User Actions

Content View

JSON WSP request
JSON WSP response

Node.js

Query
JS Objects

Mongo DB

Web Server, Built-in services

Database

Legacy Service wrappers

OPeNDAP
SSW
Giovanni

Legacy metadata

Metadata

CMR

GES DISC
Goddard Earth Sciences Data and Information Services Center
## Specification

```json
{ "type": "jsonwsp/description",  
  "version": "1.0",  
  "servicename": "Keywords service",  
  "url": "http://disc.gsfc.nasa.gov/uui/service/keywords/jsonwsp"  
"methods": {  
  "getSynonyms": {  
    "doc_lines": ["Returns synonyms"]  
    "params": {  
      "keyword": {  
        "doc_lines": ["a keyword"],  
        "type": "string",  
        "optional": false  
      }  
    },  
    "ret_info": {  
      "type": ["string"]  
    }  
  }  
}
```

## Request (POST)

```json
{ "type": "jsonwsp/request",  
  "version": "1.0",  
  "methodname": "getSynonyms",  
  "args": {  
    "keyword": "AOD"  
  }  
}
```

## Response

```json
{ "type": "jsonwsp/response",  
  "version": "1.0",  
  "servicename": "Keywords service",  
  "method": "getSynonyms",  
  "result": ["AOT",  
             "Aerosol Optical Depth"]
}
```

- Request params named based on OpenSearch/GEO
  - start, end, box, etc
- Response is formatted based on OpenSearch as well
  - totalResults, startIndex, items etc.
Service interaction – OGC WPS

Synchronous Job

Asynchronous Job

Source: OGC® WPS 2.0 Interface Standard
Service composition and reuse

• Services are simple POST calls with parameters in => results out
• Easy to wrap as a function in many languages supporting JSON (JavaScript, Python, Perl, etc.)
• Wrapper function can be used as a building block to construct complex services
  • ... Search for data
  • Then Subset the data
  • Then Process the data
  • Then Plot the data ...
Reuse by External Clients

- Easy for external clients to consume services and build composite applications
- Don’t need to know internal protocols and APIs of GES DISC applications
- Implement a single API - use with any service
Challenges and limitations

- Lack of means for automatic discovery and reuse in JSON WSP
  - Lacks semantic information (some relief in OpenSearch GEO)
  - Can’t specify acceptable required/optional combinations for args
  - Needs better customization

- Rigid communication protocol in OGC WPS
  - Does not specify retrieval of intermediate results
  - Can not process / display results of long-running jobs until complete (no piping)
Summary

- New interface provides a simple and modern user experience, replacing and integrating with a number of legacy data services and applications at GES DISC

- Service-based implementation takes advantage of modern technologies and standards
  - High maintainability, evolvability, and forward compatibility

- Services are easy to reuse by partner applications
  - Search, Subset, Regrid, Format
  - Visualization (coming soon)